

nonreducing terminus of a sugar chain via an α 1,3-linkage is the sialyl Lewis x sugar chain [NeuAc α 2-3Gal β 1-4(Fuc α 1-3)GlcNAc] synthesizing activity.

4. (Amended) A DNA selected from the following (a), (b), (c), (d), (e), (f), (g) and (h):

(a) a DNA encoding the polypeptide according to any one of claims 1, 2, 3 and 51,

(b) a DNA having nucleotides 280 to 1194 of a nucleotide sequence represented by SEQ ID NO: 3,

(c) a DNA having nucleotides 115 to 1194 of a nucleotide sequence represented by SEQ ID NO: 3,

(d) a DNA having nucleotides 1454 to 2368 of a nucleotide sequence represented by SEQ ID NO: 4,

(e) a DNA having nucleotides 1289 to 2368 of a nucleotide sequence represented by SEQ ID NO: 4,

(f) a DNA having nucleotides 460 to 1374 of a nucleotide sequence represented by SEQ ID NO: 5,

(g) a DNA having nucleotides 295 to 1374 of a nucleotide sequence represented by SEQ ID NO: 5, and

(h) a DNA hybridizing under stringent conditions with DNA selected from (a), (b), (c), (d), (e), (f) and (g); and said DNA encodes a polypeptide having an activity to transfer fucose to an N-acetylglucosamine residue in an N-acetyllactosamine (Gal β 1-4GlcNAc) structure existing in a nonreducing terminus of a sugar chain via an α 1,3-linkage, but not having an activity to transfer fucose to an α 2,3-sialyl

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N-acetylactosamine (NeuAc α 2-3Gal β 1-4GlcNAc) structure existing in a nonreducing terminus of a sugar chain via an α 1,3-linkage.

6. (Amended) The recombinant DNA according to claim 5 wherein the recombinant DNA is plasmid pAMo-mFT9 or plasmid pBS-hFT9 (S2).

7. (Amended) A transformant having the recombinant DNA according to claim 5.

8. (Amended) The transformant according to claim 7 or 52, wherein the transformant is selected from the group consisting of microorganisms, animal cells, plant cells, insect cells, non-human transgenic animals, and transgenic plants.

9. (Amended) The transformant according to claim 8, wherein the microorganism belongs to *Escherichia*.

10. (Amended) The transformant according to claim 8, wherein the animal cell is selected from the group consisting of mouse myeloma cells, rat myeloma cells, mouse hybridoma cells, CHO cell, BHK cell, African green monkey kidney cells, Namalwa cell, Namalwa KJM-1 cell, human fetal kidney cells, and human leukemia cells.

11. (Amended) The transformant according to claim 8, wherein the insect cell is selected from the group consisting of *Spodoptera frugiperda* ovarian cells, *Trichoplusia ni* ovarian cells, and silkworm ovarian cells.

12. (Amended) A method for producing a polypeptide according to any one of claims 1, 2, 3 and 51, which comprises the steps of:

culturing in a medium a transformant having a recombinant DNA obtained by inserting a DNA encoding the polypeptide into a vector;

producing and accumulating said polypeptide in said medium; and

collecting said polypeptide from said medium.

13. (Amended) A method for producing a polypeptide according to any one of claims 1, 2, 3 and 51, which comprises the steps of:

feeding a non-human transgenic animal having a recombinant DNA obtained by inserting a DNA encoding the polypeptide into a vector;

producing and accumulating said polypeptide in said non-human transgenic animal; and

collecting said polypeptide from said non-human transgenic animal.

15. (Amended) A method for producing a polypeptide according to any one of claims 1, 2, 3 and 51, which comprises the steps of:

growing a transgenic plant having a recombinant DNA obtained by inserting a DNA encoding the polypeptide into a vector;

producing and accumulating said polypeptide in said transgenic plant; and

collecting said polypeptide from said transgenic plant.

16. (Amended) A method for producing a polypeptide according to any one of claims 1, 2, 3 and 51, which comprises the steps of:

using a DNA encoding the polypeptide, and

synthesizing said polypeptide by an *in vitro* transcription-translation system.

17. (Amended) A method for producing a reaction product wherein fucose is added to an N-acetylglucosamine residue in the N-acetylglucosamine structure of an acceptor substrate via an α 1,3-linkage, using a polypeptide selected from a polypeptide according to any one of claims 1, 2, 3 and 51 as an enzyme source, which comprises the steps of:

placing in an aqueous medium (a) said enzyme source, (b) an acceptor substrate selected from (i) N-acetylglucosamine(Gal β 1-4GlcNAc), (ii) oligosaccharides having the N-acetylglucosamine structure in a nonreducing terminus thereof, (iii) complex carbohydrates having the N-acetylglucosamine structure in a nonreducing terminus of sugar chains, (iv) their derivatives wherein the N-acetylglucosamine structure is modified by sulfate group, and (v) their derivatives wherein the N-acetylglucosamine structure is modified by sugar, but a galactose residue in the N-acetylglucosamine structure is not modified by sialic acid via an α 2,3-linkage, and (c) guanosine-5'-diphosphate fucose;

producing and accumulating the reaction product, in the aqueous medium;

and

collecting said reaction product from said aqueous medium.

18. (Amended) The method for producing the reaction product according to claim 17, wherein a derivative is selected from sugar chains having, in a nonreducing terminus thereof, any one of the following oligosaccharide structures: Fuc α 1-2Gal β 1-4GlcNAc, Gal α 1-3Gal β 1-4GlcNAc, Gal α 1-3(Fuc α 1-2)Gal β 1-4GlcNAc, GalNAc α 1-3(Fuc α 1-2)Gal β 1-4GlcNAc, Gal α 1-4Gal β 1-4GlcNAc, Gal β 1-4GlcNAc(6SO₃⁻); and complex carbohydrates containing said sugar chains.

19. (Amended) A method for producing a reaction product wherein fucose is added to a glucose residue in a lactose structure of an acceptor substrate via an α 1,3-linkage, using a polypeptide according to any one of claims 1, 2, 3 and 51 as an enzyme source, which comprises the steps of:

placing in an aqueous medium (a) said enzyme source, (b) an acceptor substrate selected from (i) lactose (Gal β 1-4Glc), (ii) oligosaccharides having a lactose structure in a nonreducing terminus thereof, (iii) complex carbohydrates having a lactose structure in a nonreducing terminus of sugar chains, (iv) their derivatives wherein a lactose structure is modified by sulfate group, and (v) their derivatives wherein a lactose structure is modified by sugar(s), but a galactose residue in the lactose structure is not modified by sialic acid via an α 2,3-linkage, and (c) guanosine-5' -diphosphate fucose;

producing and accumulating the reaction product, in said aqueous medium;

and

collecting said reaction product from said aqueous medium.

20. (Amended) The method for producing the reaction product according to claim 19, wherein a derivative is selected from sugar chains having, in a nonreducing terminus thereof, any one of the following oligosaccharide structures: Gal α 1-3Gal β 1-4Glc, Gal α 1-3(Fuc α 1-2)Gal β 1-4Glc, GalNAc α 1-3(Fuc α 1-2)Gal β 1-4Glc, Gal α 1-4Gal β 1-4Glc, Gal β 1-4Glc(6SO₃⁻); and complex carbohydrates containing said sugar chains.

21. (Amended) A method for producing a sugar chain having a structure wherein fucose is added to an N-acetylglucosamine residue or a glucose residue via an α

1,3-linkage, or a complex carbohydrate containing said sugar chain, which comprises the steps of:

culturing in a medium a transformant selected from the transformants derived from microorganisms, animal cells, plant cells, and insect cells according to claim 8;

producing and accumulating the sugar chain or the complex carbohydrate in said medium; and

collecting said sugar chain or said complex carbohydrate from said medium.

22. (Amended) A method for producing a sugar chain having structure wherein fucose is added to an N-acetylglucosamine residue or a glucose residue via an α 1,3-linkage, or a complex carbohydrate containing said sugar chain, which comprises the steps of:

feeding a nonhuman transgenic animal according to claim 8;

producing and accumulating the sugar chain or the complex carbohydrate in the non-human transgenic animal; and

collecting said sugar chain or said complex carbohydrate from said non-human transgenic animal.

23. (Amended) A method for producing a sugar chain having a structure wherein fucose is added to an N-acetylglucosamine residue or a glucose residue via an α 1,3-linkage, or a complex carbohydrate containing said sugar chain, which comprises the steps of:

growing a transgenic plant according to claim 8;

producing and accumulating the sugar chain or the complex carbohydrate in said transgenic plant; and

collecting said sugar chain or said complex carbohydrate from said transgenic plant.

24. (Amended) The production method according to claim 17, wherein the complex carbohydrate is selected from the group consisting of glycoproteins, glycolipids, proteoglycans, glycopeptides, lipopolysaccharides, peptideglycans and glycosides wherein a sugar chain binds to compounds such as steroids.

25. (Amended) The method for producing the sugar chain or the complex carbohydrate according to claim 22, wherein the generation and accumulation of said sugar chain or said complex carbohydrate is carried out in the milk of said non-human transgenic animal.

26. (Amended) A method for determining the expression level of a gene encoding a polypeptide according to any one of claims 1, 2, 3 and 51, by hybridization using DNA encoding the polypeptide.

27. (Amended) An oligonucleotide selected from the following oligonucleotides: an oligonucleotide having an identical sequence to 10 to 50 contiguous nucleotides in a nucleotide sequence of DNA selected from a DNA encoding the polypeptide according to any one of claims 1, 2, 3 and 51; a DNA having the nucleotide sequence represented by SEQ ID NO: 3; a DNA having the nucleotide sequence represented by SEQ ID NO: 4; and a DNA having the nucleotide sequence represented by

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selected from a DNA encoding the polypeptide, a DNA having the nucleotide sequence represented by SEQ ID NO: 3, a DNA having the nucleotide sequence represented by SEQ ID NO: 4, and a DNA having the nucleotide sequence represented by SEQ ID NO: 5.

33. (Amended) A method for suppressing the transcription of a DNA encoding the polypeptide according to any one of claims 1, 2, 3 and 51, using an oligonucleotide selected from the following oligonucleotides: an oligonucleotide having an identical sequence to 10 to 50 contiguous nucleotides in a nucleotide sequence of DNA selected from a DNA encoding the polypeptide according to any one of claims 1, 2, 3 and 51; a DNA having the nucleotide sequence represented by SEQ ID NO: 3; a DNA having the nucleotide sequence represented by SEQ ID NO: 4; and a DNA having the nucleotide sequence represented by SEQ ID NO: 5; and, an oligonucleotide having a complementary sequence to said oligonucleotide and a derivative of each of said oligonucleotides.

34. (Amended) A method for suppressing the translation of an mRNA encoding the polypeptide according to any one of claims 1, 2, 3 and 51, using an oligonucleotide selected from the following oligonucleotides: an oligonucleotide having an identical sequence to 10 to 50 contiguous nucleotides in a nucleotide sequence of DNA selected from a DNA encoding the polypeptide according to any one of claims 1, 2, 3 and 51; a DNA having the nucleotide sequence represented by SEQ ID NO: 3; a DNA having the nucleotide sequence represented by SEQ ID NO: 4; and a DNA having the nucleotide sequence represented by SEQ ID NO: 5; and, an oligonucleotide having a complementary sequence to said oligonucleotide and a derivative of each of said oligonucleotides.

35. (Amended) An antibody recognizing a polypeptide according to any one of claims 1, 2, 3 and 51.

36. (Amended) An immunoassay which detects a polypeptide according to any one of claims 1, 2, 3 and 51, using an antibody recognizing said polypeptide.

37. (Amended) An immunohistological staining method which detects a polypeptide according to any one of claims 1, 2, 3 and 51, using an antibody recognizing said polypeptide.

38. (Amended) A reagent for immunohistological staining which contains the antibody of claim 35.

39. (Amended) An agent for diagnosing encephalopathy, renal diseases and cancers, which contains the antibody of claim 35.

40. (Amended) A method for screening a substance that changes the activity of a polypeptide according to any one of claims 1, 2, 3 and 51, which comprises contacting said polypeptide with test samples.

41. (Amended) A method for screening a substance that changes the expression of a gene encoding a polypeptide according to any one of claims 1, 2, 3 and 51, which comprises the steps of:

contacting a cell expressing said polypeptide with test samples, and

measuring the amount of the Lewis x or Lewis y sugar chain using an anti-Lewis x or anti-Lewis y antibody.

42. (Amended) A method for screening a substance that changes the expression of a gene encoding a polypeptide according to any one of claims 1, 2, 3 and 51, which comprises the steps of:

contacting a cell expressing said polypeptide with test samples, and
measuring the amount of said polypeptide using an antibody recognizing said polypeptide.

43. (Amended) A promoter DNA for the transcription of a gene encoding a polypeptide according to any one of claims 1, 2, 3 and 51.

44. (Amended) The promoter DNA according to claim 43 which functions in a cell selected from the group consisting of neurons, kidney cells, gastric epithelium cells, leukocyte cells, cerebral tumor cells, neuroblastoma cells, melanoma cells, renal cancer cells, stomach cancer cells, colon cancer cells, and pancreatic cancer cells.

45. (Amended) The promoter DNA according to claim 43 which is derived from human or mouse.

46. (Amended) A method for screening a substance that changes the efficiency of transcription by a promoter DNA according to claim 43, which comprises the steps of:

transforming an animal cell with a plasmid comprising the promoter DNA and a reporter gene ligated downstream of said promoter DNA;

contacting transformant with a test sample; and

measuring the amount of the translation product of said reporter gene.

47. (Amended) The screening method according to claim 46, wherein the reporter gene is a gene selected from the group consisting of chloramphenicol acetyltransferase genes, β -galactosidase genes, luciferase genes and green fluorescent protein genes.

48. (Amended) A non-human knockout animal wherein a DNA encoding the polypeptide according to any one of claims 1, 2, 3 and 51 is deleted or mutated.

49. (Amended) The non-human knockout animal according to claim 48, wherein the non-human knockout animal is a mouse.

50. (Amended) A method for treating renal diseases or cancers using a method according to claim 31.

51. (New) The polypeptide according to claim 2, wherein the activity of transferring fucose to an N-acetylglucosamine residue in the Gal β 1-4GlcNAc structure existing in a nonreducing terminus of a sugar chain via an α 1,3-linkage is the Lewis x sugar chain [Gal β 1-4(Fuc α 1-3)GlcNAc] and the Lewis y sugar chain [Fuc α 1-2Gal β 1-4(Fuc α 1-3)GlcNAc] synthesizing activity, and the activity of transferring fucose to an N-acetylglucosamine residue in the NeuAc α 2-3Gal β 1-4GlcNAc structure existing in a

nonreducing terminus of a sugar chain via an α 1,3-linkage is the sialyl Lewis x sugar chain [NeuAc α 2-3Gal β 1-4(Fuc α 1-3)GlcNAc] synthesizing activity.

52. (New) A transformant having the recombinant DNA according to claim 6.

53. (New) The production method according to claim 18, wherein the complex carbohydrate is selected from the group consisting of glycoproteins, glycolipids, proteoglycans, glycopeptides, lipopolysaccharides, peptideglycans and glycosides wherein a sugar chain binds to compounds such as steroids.

54. (New) The production method according to claim 19, wherein the complex carbohydrate is selected from the group consisting of glycoproteins, glycolipids, proteoglycans, glycopeptides, lipopolysaccharides, peptideglycans and glycosides wherein a sugar chain binds to compounds such as steroids.

55. (New) The production method according to claim 20, wherein the complex carbohydrate is selected from the group consisting of glycoproteins, glycolipids, proteoglycans, glycopeptides, lipopolysaccharides, peptideglycans and glycosides wherein a sugar chain binds to compounds such as steroids.

56. (New) The production method according to claim 21, wherein the complex carbohydrate is selected from the group consisting of glycoproteins, glycolipids, proteoglycans, glycopeptides, lipopolysaccharides, peptideglycans and glycosides wherein a sugar chain binds to compounds such as steroids.

57. (New) The production method according to claim 22, wherein the complex carbohydrate is selected from the group consisting of glycoproteins, glycolipids, proteoglycans, glycopeptides, lipopolysaccharides, peptidoglycans and glycosides wherein a sugar chain binds to compounds such as steroids.

58. (New) The production method according to claim 23, wherein the complex carbohydrate is selected from the group consisting of glycoproteins, glycolipids, proteoglycans, glycopeptides, lipopolysaccharides, peptidoglycans and glycosides wherein a sugar chain binds to compounds such as steroids.

59. (New) A method for determining the expression level of a gene encoding a polypeptide according to any one of claims 1, 2, 3, and 51 by polymerase chain reaction, using an oligonucleotide selected from the following oligonucleotides: an oligonucleotide having an identical sequence to 10 to 50 contiguous nucleotides in a nucleotide sequence of DNA selected from a DNA encoding the polypeptide according to any one of claims 1, 2, 3, and 51; a DNA having the nucleotide sequence represented by SEQ ID NO: 3; a DNA having the nucleotide sequence represented by SEQ ID NO: 4; and a DNA having the nucleotide sequence represented by SEQ ID NO: 5; and, an oligonucleotide having a complementary sequence to said oligonucleotide and a derivative of each of said oligonucleotides,

wherein said oligonucleotide derivative is selected from the following oligonucleotide derivatives: an oligonucleotide derivative obtained by converting a phosphodiester bond into a phosphorothioate bond in an oligonucleotide; an oligonucleotide derivative obtained by converting a phosphodiester bond into a N3'-P5' phosphoamidate bond in an oligonucleotide; an oligonucleotide derivative obtained by

converting a ribose and phosphodiester bond into a peptide-nucleic-acid bond in an oligonucleotide; an oligonucleotide derivative obtained by substituting uracil with C-5 propynyl uracil in an oligonucleotide; an oligonucleotide derivative obtained by substituting uracil with C-5 thiazolyl uracil in an oligonucleotide; an oligonucleotide derivative obtained by substituting cytosine with C-5 propynylcytosine in an oligonucleotide; an oligonucleotide derivative obtained by substituting cytosine with phenoxazine-modified cytosine in an oligonucleotide; an oligonucleotide derivative obtained by substituting ribose with 2'-O-propylribose in a DNA; and an oligonucleotide derivative obtained by substituting ribose with 2'-methoxyethoxyribose in the oligonucleotide.

60. (New) A method for suppressing the transcription of a DNA encoding the polypeptide according to any one of claims 1, 2, 3 and 51, using an oligonucleotide selected from the following oligonucleotides: an oligonucleotide having an identical sequence to 10 to 50 contiguous nucleotides in a nucleotide sequence of DNA selected from a DNA encoding the polypeptide according to any one of claims 1, 2, 3 and 51; a DNA having the nucleotide sequence represented by SEQ ID NO: 3; a DNA having the nucleotide sequence represented by SEQ ID NO: 4; and a DNA having the nucleotide sequence represented by SEQ ID NO: 5; and, an oligonucleotide having a complementary sequence to said oligonucleotide and a derivative of each of said oligonucleotides,

wherein said oligonucleotide derivative is selected from the following oligonucleotide derivatives: an oligonucleotide derivative obtained by converting a phosphodiester bond into a phosphorothioate bond in an oligonucleotide; an oligonucleotide derivative obtained by converting a phosphodiester bond into a N3'-P5' phosphoamidate bond in an oligonucleotide; an oligonucleotide derivative obtained by

converting a ribose and phosphodiester bond into a peptide-nucleic-acid bond in an oligonucleotide; an oligonucleotide derivative obtained by substituting uracil with C-5 propynyl uracil in an oligonucleotide; an oligonucleotide derivative obtained by substituting uracil with C-5 thiazolyl uracil in an oligonucleotide; an oligonucleotide derivative obtained by substituting cytosine with C-5 propynylcytosine in an oligonucleotide; an oligonucleotide derivative obtained by substituting cytosine with phenoxazine-modified cytosine in an oligonucleotide; an oligonucleotide derivative obtained by substituting ribose with 2'-O-propylribose in a DNA; and an oligonucleotide derivative obtained by substituting ribose with 2'-methoxyethoxyribose in the oligonucleotide.

61. (New) A method for suppressing the translation of an mRNA encoding the polypeptide according to any one of claims 1, 2, 3 and 51, using an oligonucleotide selected from the following oligonucleotides: an oligonucleotide having an identical sequence to 10 to 50 contiguous nucleotides in a nucleotide sequence of DNA selected from a DNA encoding the polypeptide according to any one of claims 1, 2, 3 and 51; a DNA having the nucleotide sequence represented by SEQ ID NO: 3; a DNA having the nucleotide sequence represented by SEQ ID NO: 4; and a DNA having the nucleotide sequence represented by SEQ ID NO: 5; and, an oligonucleotide having a complementary sequence to said oligonucleotide and a derivative of each of said oligonucleotides,

wherein said oligonucleotide derivative is selected from the following oligonucleotide derivatives: an oligonucleotide derivative obtained by converting a phosphodiester bond into a phosphorothioate bond in an oligonucleotide; an oligonucleotide derivative obtained by converting a phosphodiester bond into a N3'-P5' phosphoamidate bond in an oligonucleotide; an oligonucleotide derivative obtained by

converting a ribose and phosphodiester bond into a peptide-nucleic-acid bond in an oligonucleotide; an oligonucleotide derivative obtained by substituting uracil with C-5 propynyl uracil in an oligonucleotide; an oligonucleotide derivative obtained by substituting uracil with C-5 thiazolyl uracil in an oligonucleotide; an oligonucleotide derivative obtained by substituting cytosine with C-5 propynylcytosine in an oligonucleotide; an oligonucleotide derivative obtained by substituting cytosine with phenoxazine-modified cytosine in an oligonucleotide; an oligonucleotide derivative obtained by substituting ribose with 2'-O-propylribose in a DNA; and an oligonucleotide derivative obtained by substituting ribose with 2'-methoxyethoxyribose in the oligonucleotide.

62. (New) The promoter DNA according to claim 44 which is derived from human or mouse.

63. (New) A method for screening a substance that changes the efficiency of transcription by a promoter DNA according to claim 44, which comprises the steps of:
transforming an animal cell with a plasmid comprising the promoter DNA and a reporter gene ligated downstream of said promoter DNA;
contacting transformant with a test sample; and
measuring the amount of the translation product of said reporter gene.

64. (New) A method for screening a substance that changes the efficiency of transcription by a promoter DNA according to claim 45, which comprises the steps of:
transforming an animal cell with a plasmid comprising the promoter DNA and a reporter gene ligated downstream of said promoter DNA;

contacting transformant with a test sample; and
measuring the amount of the translation product of said reporter gene.

65. (New) A method for screening a substance that changes the efficiency of transcription by a promoter DNA according to claim 62, which comprises the steps of:
transforming an animal cell with a plasmid comprising the promoter DNA and a reporter gene ligated downstream of said promoter DNA;
contacting transformant with a test sample; and
measuring the amount of the translation product of said reporter gene.

66. (New) The screening method according to claim 63, wherein the reporter gene is a gene selected from the group consisting of chloramphenicol acetyltransferase genes, β -galactosidase genes, luciferase genes and green fluorescent protein genes.

67. (New) The screening method according to claim 64, wherein the reporter gene is a gene selected from the group consisting of chloramphenicol acetyltransferase genes, β -galactosidase genes, luciferase genes and green fluorescent protein genes.

68. (New) The screening method according to claim 65, wherein the reporter gene is a gene selected from the group consisting of chloramphenicol acetyltransferase genes, β -galactosidase genes, luciferase genes and green fluorescent protein genes.

70. (New) A method for treating renal diseases or cancers using a method according to claim 33.

72. (New) A method for treating renal diseases or cancers using a method according to claim 34.

73. (New) A method for treating renal diseases or cancers using a method according to claim 61.

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